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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,449	01/06/2004	Russell D. Braunling	H0006146-1633	2586

7590 01/12/2006

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EXAMINER
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WALLENHORST, MAUREEN

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 01/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/751,449

Applicant(s)

BRAUNLING ET AL.

Examiner

Maureen M. Wallenhorst

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 19 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 19 recites that the metallic element is composed of a material that corrodes substantially faster than the piece of equipment. However, the specification, as originally filed, does not provide support for this limitation since the specification only states that the metallic element is more sensitive to the environment than the metal in the piece of equipment being monitored. See paragraph nos. 7 and 13 in the specification. This teaching in the specification does not necessarily mean that the metallic element corrodes faster than the equipment since the description of "more sensitive" has not been adequately defined or described in such a way. Therefore, the recitation of claim 19 represents new matter not supported by the specification as originally filed.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-8, 10-18 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Byrne et al in view of Davis et al (US Patent no. 5,859,537, submitted in the Information Disclosure Statement filed on March 11, 2005).

Byrne et al teach of a corrosion monitor system and method of use that facilitates the detection and monitoring of material corrosion in remote areas such as aircraft surfaces. The system comprises a sensor that operates on the principal that corrosion of a metallic conductor will cause a corresponding increase in the cross-sectional electrical resistance of that conductor. This increase in resistance is due to actual material loss during the corrosion of the metallic surface. The sensor comprises a coupon 100 made of a metallic material that is the same as that of a structure being monitored with the sensor. Coupon 100 is divided into two halves 102 and

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104 that are separated by a channel 106. Half 104 is covered by a coating 108 and serves as a reference portion or conductor, whereas half 102 is exposed to the environment to serve as a test portion or conductor. Leads 112 and 114 are connected to the halves 102, 104 so as to supply voltage thereto. The system monitors relative changes in the electrical resistance of the test conductor by comparing the voltage across it to that of the reference conductor. This comparison method enables the system to detect very small incremental changes in the resistance of the test conductor. Byrne et al also teach that the corrosion monitor contains a thermistor therein to measure the sensor temperature and compensate the corrosion measurements for the effects of ambient temperature. Byrne et al teach that the corrosion sensor records changes in resistance on a periodic basis over an extended period of time such as once a day. See lines 54-68 in column 1, lines 1-32 in column 2, lines 15-65 in column 3 and lines 12-32 in column 4 of Byrne et al. Byrne et al also teach that the corrosion monitor comprises a measuring and data storage device in the form of a controller 216 that includes software to measure the resistance of the test conductor and the reference conductor as well as memory to store the measured resistance values. See lines 29-68 in column 7 and lines 1-10 in column 8 of Bryne et al. Bryne et al also teach that the corrosion monitoring system can be connected to an external computer for post-processing of the data and interpretation. See lines 30-33 in column 2 of Bryne et al. In-situ corrosion rates are calculated automatically for the sensor by measuring the relative change in response signal as a function of exposure time. See lines 33-36 in column 9 of Bryne et al. Bryne et al teach that the sensor may be fabricated from a thin-film of steel such as carbon steel. See lines 16-22 in column 13 of Bryne et al. Bryne et al also teach that the response of the corrosion sensor can be compared to expected levels of corrosion severity of the material being

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monitored when located in different environments including different temperature and humidity conditions. See lines 56-65 in column 15 and lines 1-16 in column 16 of Byrne et al. Therefore, the corrosion monitor and method of use taught by Byrne et al comprises a metallic element having a test portion and a reference portion, wherein the metallic element is placed in an environment in which a piece of equipment (i.e. an aircraft structure) is located, a measuring and data storage device (i.e. a controller) configured to measure the resistance of the test portion and the reference portion, and a computer configured to determine the amount of corrosion experienced by the metallic element based on the resistances measured with the controller. Byrne et al fail to teach of correlating the amount of corrosion measured with the metallic element with a maintenance schedule for the piece of equipment.

Davis et al teach of an electrochemical corrosion sensor that is used to monitor and measure the amount of corrosion on a painted and bonded metal structure such as an aircraft, vehicle, ship, etc. The sensor comprises a metal coupon having electrodes thereon that is placed in the environment in which a piece of equipment to be monitored is present. The impedance of the sensor is measured periodically in order to determine the amount of corrosion experienced by the piece of equipment in the environment over time. Davis et al teach that the electrochemical sensor allows maintenance inspectors to detect the early stages of degradation or corrosion before serious deterioration has occurred. Davis et al teach that the results of the sensor are used to schedule maintenance on a piece of equipment based on the actual condition of the structure rather than based on an elapsed time schedule. Thus, the results of the electrochemical sensor allow an "as required" maintenance schedule for a piece of equipment, allow performance of repairs to a piece of equipment before it becomes too costly to perform them, and provide

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quantitative data regarding corrosion rates and mechanisms of degradation. See lines 15-32 in column 1 and lines 15-49 in column 3 of Davis et al.

Based upon the combination of Bryne et al and Davis et al, it would have been obvious to one of ordinary skill in the art at the time of the instant invention to correlate the amount of corrosion for a piece of equipment measured with the metallic element taught by Byrne et al with a maintenance schedule for the piece of equipment since Davis et al teach that it is known and beneficial in the art to use the results of corrosion monitoring obtained with an electrical coupon-type sensor, similar to the sensor disclosed by Bryne et al, for obtaining an "as required" maintenance schedule for a piece of equipment and for scheduling maintenance on a piece of equipment based on the actual condition of the structure rather than based on an elapsed time schedule. It also would have been obvious to one of ordinary skill in the art to validate the amount of corrosion measured with the device taught by Bryne et al based upon conditions of the environment such as temperature and humidity since Bryne et al teach that temperature and humidity conditions cause certain levels of corrosion to a metal object, thus affecting the overall corrosion rate of the object.

7. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Byrne et al in view of Davis et al as applied to claims 1-8, 10-18 and 20-21 above, and further in view of Runner (US Patent no. 5,243,298, previously cited). For a teaching of Bryne et al and Davis et al, see previous paragraphs in this Office action. Bryne et al fail to teach that the metallic material in the corrosion-monitoring coupon can be composed of a material that corrodes faster than the piece of equipment being monitored.

Runner teaches of a corrosion monitor and a method for monitoring corrosion of a structure such as an aircraft wing. The monitor comprises an anodic metal material that corrodes preferentially with respect to the structure being tested. Runner teaches that the anodic metal is preferably zinc, but can be other metallic materials that preferentially corrode to the structure being monitored. The anodic material comprises a wire 10 that is disposed in an environment in which the structure being monitored is located. Specifically, the wire 10 is disposed inside an aircraft wing 12 having a sealed core 14 that is susceptible to corrosion by moisture. Anode wire 10 is preferably disposed between the core 14 and the skin 16 of an aircraft wing 12. A measuring device 22 for measuring electrical resistance is connected across the anode wire 10. Measuring device continuously measures the resistance of the anode wire 10 and continuously calculates the rate at which the resistance changes. If moisture intrusion occurs, anode wire 10 will begin to corrode before core 14, which will remain undamaged until all the anode material has been consumed in the electrochemical corrosion process. Core 14 will not begin to corrode until anode wire 10 has completely corroded through, i.e. after its resistance has become infinite. Measuring device 22 calculates the rate of change of resistance, and also extrapolates the resistance using the present rate of change to the point in time where the resistance is infinite. Thus, measuring device 22 provides an indication of the time remaining before onset of corrosion in the wing core 14. Measuring device 22 has a computer for processing resistance values sampled at suitable intervals. The measuring device may also provide maintenance personnel with the date on which structural corrosion is predicted to occur so as to aid in decisions concerning the continued use of the aircraft or its return for maintenance. Runner teaches that the corrosion monitor provides a valuable maintenance scheduling tool by reducing



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guesswork since before the onset of corrosion of the wing core 14, the aircraft may be scheduled for maintenance. The maintenance may be scheduled to coincide with the onset of corrosion or to be performed at a later time, after a predetermined amount of structural corrosion has occurred. See lines 64-68 in column 2, lines 1-68 in column 3, lines 1-2 and 38-68 in column 4 and lines 1-48 in column 5 of Runner.

Based upon the combination of Bryne et al, Davis et al and Runner, it would have been obvious to one of ordinary skill in the art at the time of the instant invention to manufacture the metallic material in the corrosion-monitoring coupon taught by Bryne et al out of a material that corrodes faster than the piece of equipment being monitored, similar to the corrosion monitor taught by Runner, so as to be able to detect when a corrosive environment exists in an area before the piece of equipment being monitored in the area is subjected to corrosion so that measures can be taken to correct the environment and maintain the proper functioning of the equipment for a longer period of time.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Please make note of: Harris et al who teach of a corrosion sensing microsensor.

9. Applicant's arguments filed November 10, 2005 have been fully considered but they are not persuasive.

Applicants argue the rejection of the claims under 35 USC 103 as being obvious over Bryne et al in view of Davis et al by stating that while Davis et al teach of obtaining an "as required" maintenance schedule for a piece of equipment based upon a corrosion monitor, Davis et al fail to teach that the "as required" maintenance schedule includes adjusting the timing of

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previously scheduled maintenance, as now recited in the claims. In response to this argument, it is noted that the new limitation in the claims concerning adjusting the time of previously scheduled maintenance for a piece of equipment based upon an amount of corrosion measured with a corrosion monitor is obvious in view of Davis et al since Davis et al teach that maintenance on a piece of equipment can be scheduled on an "as needed" basis instead of at fixed time intervals. Therefore, if maintenance on a piece of equipment is scheduled for a certain predetermined time, but the corrosion monitor taught by Davis et al indicates that maintenance is not required yet at this time, then the maintenance at the predetermined time would not be performed since it is not required and deemed necessary yet. In accordance with the disclosure of Davis et al, maintenance on the piece of equipment would not be performed until it was required, as indicated by the corrosion monitor, and this would involve adjusting the time of the previously scheduled maintenance.

Applicants also argue that none of the references teach or suggest comparing the measured amount of corrosion, obtained with a corrosion monitor, to an expected amount of corrosion since Bryne et al only teaches of doing this in a test environment, not in an environment where a piece of equipment is being monitored with a corrosion sensor. In response to this argument, it is noted that it would have been obvious to one of ordinary skill in the art to compare a measured level of corrosion in a working environment in which a piece of equipment is being monitored to an expected level of corrosion so as to ensure that the corrosion monitor is working properly, similar to the comparison between the measured level and expected level of corrosion in the test environment taught by Bryne et al, since when operating a corrosion monitor in either a working or a test environment, one of ordinary skill in the art wants to ensure that it is

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operating properly to accurately report a certain level of corrosion known to exist in the environment. For example, the secondary reference to Davis et al teaches of comparing or correlating the corrosion results obtained with a metallic electrochemical impedance spectroscopy (EIS) sensor to the corrosion results obtained with other known techniques of measuring corrosion such as ellipsometry, DC potentiodynamic measurements and using remote electrodes so as to ensure that the same results are achieved with each of the different methods. This comparison or correlation is an obvious step in any kind of corrosion monitoring with any kind of sensor so as to ensure that the sensor is working properly. The sensor must work properly in either a test environment or a working environment in order to obtain reliable, accurate results.

Applicants also argue that neither reference to Bryne et al or Davis et al teach of validating a measured amount of corrosion based upon conditions of the environment such as temperature and humidity, as recited in the claims. In response to this argument, the examiner does not agree with Applicants since Bryne et al clearly teach of compensating or validating a measured amount of corrosion based upon the temperature of the environment in which the piece of equipment being monitored is located, and temperature is a condition of the environment. See lines 57-68 in column 4 and lines 1-25 in column 5 of Bryne et al where it states that the response of the corrosion monitor will vary in accordance with the temperature of the environment in which the monitor is located, which could produce erroneous results. Bryne et al teach that a solution to this problem is to take temperature measurements in the vicinity of the corrosion monitor with conventional instruments such as a thermometer and calculate appropriate compensations in the output of the device since the temperature effect on the

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corrosion monitor is known or may be easily developed. Therefore, the results of the corrosion monitor in Bryne et al are validated for temperature.

For all of the above reasons, Applicants' arguments are not found persuasive.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen M. Wallenhorst whose telephone number is 571-272-1266. The examiner can normally be reached on Monday-Wednesday from 6:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden, can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Maureen M. Wallenhorst  
Primary Examiner  
Art Unit 1743

mmw

January 9, 2006

*Maureen M. Wallenhorst*  
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